Units 8 & 9 Review

1.) ___ $CaCl_2$ + _2_ $AgNO_3$ → ___ $Ca(NO_3)_2$ + _2_ AgCl

(A) Type of equation? Double replacement

(B) If 50.0 grams of calcium chloride are reacted with excess silver nitrate, how many grams of silver chloride can be produced? 129 g of AgCl (work shown below)

(C) What is the percent yield if a student makes 118 grams of silver chloride in this experiment? 91.5% yield

2.) _2_ $Fe(HCO_3)_3$ → ___ Fe_2O_3 + _3_ H_2O + _6_ CO_2

(A) Type of reaction? Decomposition

(B) A lab group decomposed 15.0 grams of $Fe(HCO_3)_3$. What is the theoretical yield of iron (III) oxide? 5.01 g

(C) If the lab group produced 4.63 grams of iron (III) oxide, what is their percent yield? 92.4%

3.) ___ Au + ___HNO_3 + _3_HCl → ___ $AuCl_3$ + ___NO + _2_ H_2O

(A) How many grams of hydrochloric acid (HCl) are needed to completely react 1.25 moles of gold metal? 137 g

4.) ___ Fe + _2_ $CuNO_3$ → ___ $Fe(NO_3)_2$ + _2_ Cu

(A) How do we know that this reaction actually happens? Fe is higher than Cu on Activity Series

(B) When 3.7 moles of iron are reacted with excess copper (I) nitrate, how many moles of copper are produced? 7.4 moles

5.) ___ $Ca_3(PO_4)_2$ + _3_ SiO_2 + _5_ C → _2_ P + _3_ $CaSiO_3$ + _5_ CO

(A) How many moles of $CaSiO_3$ would be produced by the complete reaction of 225.5 grams of calcium phosphate? 2.180 moles

6.) ___ Ca + _2_ H_2O → ___ $Ca(OH)_2$ + ___ H_2

(A) How many molecules of water would be needed to react completely with 34.2 grams of calcium? 1.03×10^{24} molecules

7.) _2_ K_3PO_4 + _3_ $MgCl_2$ → ___ $Mg_3(PO_4)_2$ + _6_ KCl

(A) What is the theoretical yield of potassium chloride if 21.7 grams of magnesium chloride are reacted with 25.4 grams of potassium phosphate? 26.8 g

(B) How many grams of excess reactant remain after the reaction is complete? 4.6 g

8.) _2_ K_3PO_4 + _3_ $MgCl_2$ → ___ $Mg_3(PO_4)_2$ + _6_ KCl

(A) How many grams of potassium chloride if 2.17×10^{24} molecules of magnesium chloride are reacted with excess potassium phosphate? 537 g

9.) 2 Al + 3 $NiCl_2$ → 3 Ni + 2 $AlCl_3$

10.) $Zn(NO_3)_2$ + Mg → Zn + $Mg(NO_3)_2$

11.) Cu + Na_2SO_4 → no reaction

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12.) $CsF + I_2 \rightarrow$ no reaction

13.) $Cl_2 + 2\ NaBr \rightarrow 2\ NaCl + Br_2$

14.) $Pb(ClO_3)_2 + 2\ K \rightarrow Pb + 2\ KClO_3$

15.) $Mn + LiOH \rightarrow$ no reaction

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1. (B) If 50.0 grams of calcium chloride are reacted with excess silver nitrate, how many grams of silver chloride can be produced?

$\frac{50.0\text{ g } CaCl_2}{|\ 111.1\text{ g}} \times \frac{1\text{ mole}}{} = 0.450\text{ moles } CaCl_2$

$\frac{0.450\text{ moles } CaCl_2}{1} = \frac{x\text{ moles AgCl}}{2}$ x = 0.9 moles AgCl

$\frac{0.9\text{ moles AgCl}}{|\ 1\text{ mole}} \times \frac{143.4\text{ g}}{} =$ **129 g AgCl**

(C) What is the percent yield if a student makes 118 grams of silver chloride in this experiment?

$\frac{118\text{ g}}{129\text{ g}} \times 100 = 91.5\%$

2. (B) A lab group decomposed 15.0 grams of $Fe(HCO_3)_3$. What is the theoretical yield of iron (III) oxide?

$\frac{15.0\text{ g } Fe(HCO_3)_3}{|\ 238.8\text{ g}} \times \frac{1\text{ mole}}{} = 0.0628\text{ moles } Fe(HCO_3)_3$

$\frac{0.0628\text{ moles } Fe(HCO_3)_3}{2} = \frac{x\text{ moles } Fe_2O_3}{1}$ x = 0.0314 molesFe_2O_3

$\frac{0.0314\text{ moles } Fe_2O_3}{|\ 1\text{ mole}} \times \frac{159.6\text{ g}}{} =$ **5.01 g**

(C) If the lab group produced 4.63 grams of iron (III) oxide, what is their percent yield?

$\frac{4.63\text{ g}}{5.01\text{ g}} \times 100 = 92.4\%$

3. (A) How many grams of hydrochloric acid (HCl) are needed to completely react 1.25 moles of gold metal?

$\frac{1.25\text{ moles Au}}{1} = \frac{x\text{ moles HCl}}{3}$ 3.75 moles HCl

$\frac{3.75\text{ moles HCl}}{|\ 1\text{ mole}} \times \frac{36.5\text{ g}}{} =$ **137 g**

4. (B) When 3.7 moles of iron are reacted with excess copper (I) nitrate, how many moles of copper are produced?

$\frac{3.7\text{ moles Fe}}{1} = \frac{x\text{ moles Cu}}{2}$ x = **7.4 moles Cu**

5. (A) How many moles of $CaSiO_3$ would be produced by the complete reaction of 225.5 grams of calcium phosphate?

$\frac{225.5\text{ g}}{|\ 310.3\text{ g}} \times \frac{1\text{ mole}}{} = 0.727\text{ moles } Ca_3(PO_4)_2$

$\frac{0.727\text{ moles } Ca_3(PO_4)_2}{1} = \frac{x\text{ moles } CaSiO_3}{3}$ x = **2.181 moles $CaSiO_3$**

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6. (A) How many molecules of water would be needed to react completely with 34.2 grams of calcium

34.2 g Ca | 1 mole = 0.853 moles Ca
| 40.1 g

0.853 moles Ca = x moles H_2O x = 1.706 moles H_2O
1 2

1.706 moles | 6.022×10^{23} mcs = **1.03×10^{24} molecules H_2O**
| 1 mole

7. (A) What is the theoretical yield of potassium chloride if 21.7 grams of magnesium chloride are reacted with 25.4 grams of potassium phosphate?

21.7 g $MgCl_2$ | 1 mole = 0.228 moles $MgCl_2$
| 95.3 g

25.4 g K_3PO_4 | 1 mole = 0.1196 moles K_3PO_4
| 212.3 g

Determine LR.

0.228 = 0.076
3

0.1196 = 0.0598****
2

0.1196 moles K_3PO_4 = x moles KCl x = 0.3588 moles KCl
2 6

0.3588 moles KCl | 74.6 g = **26.8 g KCl**
| 1 mole

(B) How many grams of excess reactant remain after the reaction is complete?

0.1196 moles K_3PO_4 = x moles $MgCl_2$ x = 0.1794 moles $MgCl_2$
2 3

0.1794 moles $MgCl_2$ used | 95.3 g = 17.1 g used 21.7 g – 17.1 g = **4.6 g left over**
| 1 mole

8. (A) How many grams of potassium chloride if 2.17×10^{24} molecules of magnesium chloride are reacted with excess potassium phosphate? 537 g

2.17×10^{24} mcs $MgCl_2$ | 1 mole = 3.60 moles $MgCl_2$
| 6.022×10^{23} mcs

3.60 moles $MgCl_2$ = x moles KCl x = 7.2 moles KCl
3 6

7.2 moles KCl | 74.6 g = **537 g KCl**
| 1 mole